

Concept for Dynamic Temperature-Dependent R-Factor Insulation

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Simon Edwards

Research Acceleration Initiative

Introduction

MIT's revolutionary design of a non-vacuum insulator that is "absolutely insulating," beyond its applications involving computing, with the addition of an elastomer substrate may have commercial application for the insulation of homes, cars and clothing.

Abstract

Said insulation would have as an advantage being potentially quite thin; perhaps only about a millimeter in thickness; and would nonetheless have the potential to provide effective insulation at an extremely wide range of temperatures. One potential application for such a material would be aerospace as many electronic components enjoy greater reliability and lifespan when thermal conditions are regulated, given the wide range of temperatures experienced by orbital platforms.

Elastomers expand more than other materials when heated. Should they be doped with a layer of, for example, GaTe₂ with silver ion within the tetrahedron (a structure which, sans the elastomer, was described by MIT researchers in May 2022 with phonon-to-electron conversion or vice versa in mind,) the material would be an insulator which provides a greater degree of insulation the more closely spaced the GaTe₂ nodes happen to be. That spacing, in an elastomer substrate, would be lesser the lesser the temperature of the material.

Conclusion

Dynamic R-Factor insulation has the potential to revolutionize the insulation industry and may keep homes and individuals warm during the winter at exceptionally low cost and without the complications associated with over- or under-insulation.